Pennsylvania Avenue Extension (PAX)

Final Project Initiation Report

San Francisco
County Transportation
Authority

Agenda Item 6

June 22, 2022

PAX Project Purpose & Goals

San Francisco County Transportation Authority

Purpose

Grade separate the existing at-grade rail alignment at Mission Bay Drive and 16th Street

GOALS	DESCRIPTION
Improve Street Connectivity	Increase connectivity between Mission Bay, Potrero Hill, and Design District/SOMA neighborhoods
Improve Rail Operations	Allow for more efficient Caltrain Operations and Service Planning
Improve Surface Safety	Improve pedestrian, bike, and vehicular safety on surface streets
Improve Quality of Life	Decrease congestion, improve air quality, and reduce noise, among other factors

Project Context

San Francisco County Transportation Authority

1. **Railyard Alignment and Benefits Study (Planning Dept.)**
   - Established neighborhood connectivity, safety, rail operations, and traffic goals
   - Promoted undergrounding the at-grade crossings in the area to address local traffic challenges
   - Proposed the Pennsylvania Avenue Extension (PAX) tunnel from Railyards to Cesar Chavez Street
2. **Southeast Rail Station Study (Planning Dept.)**
   - Considers potential future infill station locations within the Bayview

PAX Study Outcomes

San Francisco County Transportation Authority

1. **Developed & narrowed down feasible alignment alternatives**
   - Three feasible alternatives identified, with variations
2. **Developed preliminary capital cost estimates for alternatives**
   - $2.0-$2.5 billion (excluding station cost)
3. **Advanced design of project interfaces**
   - DTX project
   - Railyards project
   - Existing infrastructure

PAX Summary of Alternatives

San Francisco County Transportation Authority

A. Long Alignment (Railyards to Cesar Chavez St)

1. Single Bore TBM (A1), 42-foot Diameter
2. Twin Bore TBM (A2), 26-foot Diameter (adjacent, not stacked)

B. Mid-Length Alignment (Railyards to 22nd St)

1. Single Bore TBM/SEM (B1), 42-foot Diameter
2. Twin Bore TBM/SEM (B2), 26-foot Diameter (adjacent, not stacked)

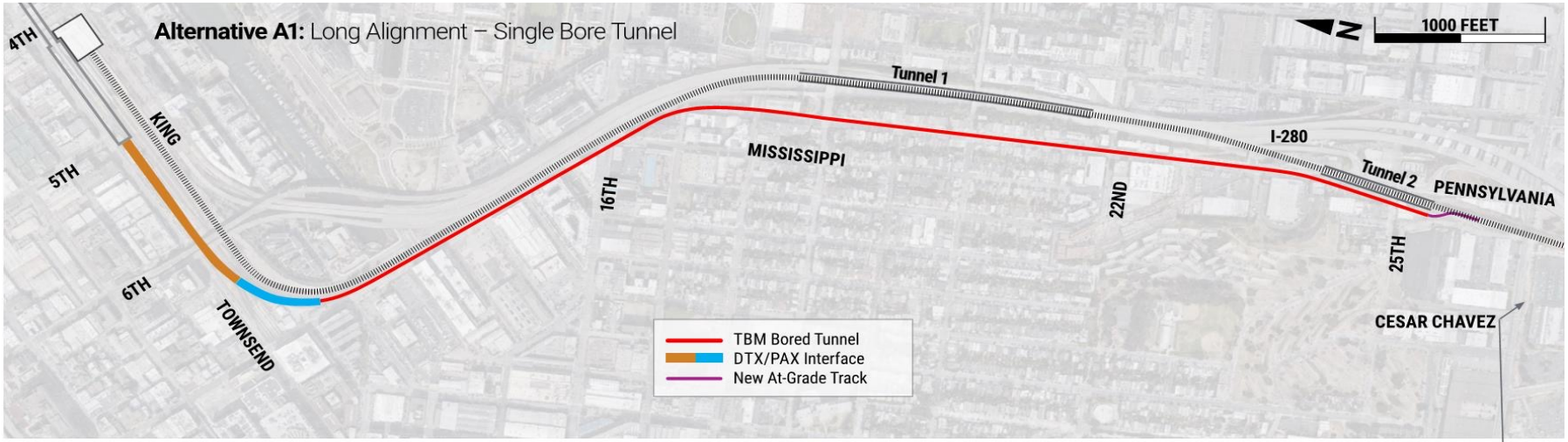
C. Short Alignment (Railyards to 22nd St)

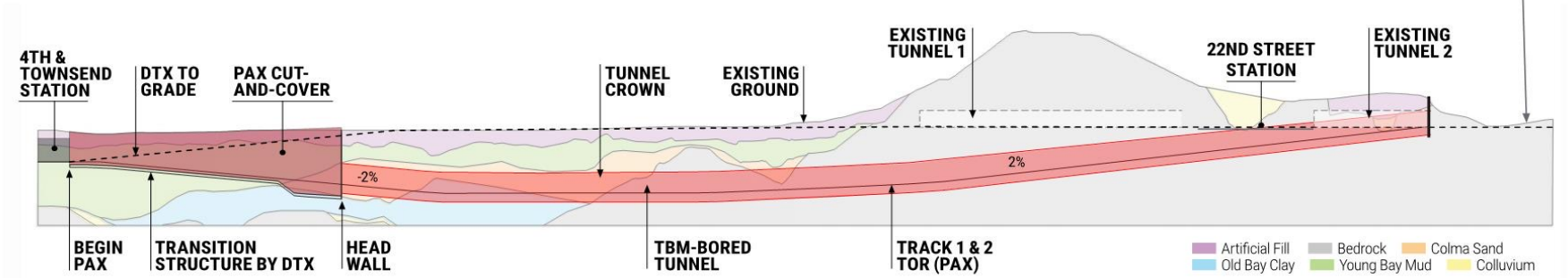
Northbound Cut-and-Cover with U-Wall Trench, Southbound TBM, 26-foot

Notes: TBM – Tunnel Boring Machine; SEM – Sequential Excavation Mining

Sample Alternative Plan & Profile

San Francisco County Transportation Authority





Alternatives Comparison

San Francisco County Transportation Authority

ALTERNATIVE	A1	A2	B1	B2	C
Description	Long, Single Bore	Long, Twin Bores	Mid-length, Single Bore	Mid-length, Twin Bores	Short, Split Tunnels
Benefits	• Reduced construction risk/surface impacts • Improved rail operations/crossovers • Single tunneling method	• Reduced construction risk/surface impacts • Improved rail operations • Smaller TBMs lead to faster construction	• Use of 22nd St Station with modifications • Allows for internal cross passages	• Use of 22nd St Station with modifications • Easier to source smaller TBMs	• Use of 22nd Street Station • Sufficient ground cover
Challenges	• Requires 22nd Street station relocation • Reduced ground cover at Southern third	• Requires 22nd Street station relocation • Complex crossovers • Minimal horizontal tunnel separation	• Uses abandoned Tunnel 2 (unknown condition) • Breaks in to in-use Tunnel 1 • Requires TBM & SEM	• Tunnel interface issues • Complex crossovers • Modifications to I-280 bridge piers • Minimal horizontal tunnel separation	• Increased surface construction & utility impacts • Disruption to existing rail operations • TBM & Cut-and-Cover

Order of Magnitude Cost Estimates

San Francisco County Transportation Authority

ALTERNATIVE	A1: LONG/ SINGLE BORE	A2: LONG/ TWIN BORES	B1: MID-LENGTH/ SINGLE BORE	B2: MID-LENGTH/ TWIN BORES	C: SHORT/SPLIT TUNNELS
Escalated Construction Costs*	$1,200 M	$1,290 M	$1,180 M	$1,150 M	$1,100 M
ROW Costs	$110 M	$200 M	$60 M	$140 M	$50 M
Soft Costs	$310 M	$310 M	$310 M	$310 M	$310 M
Contingency	$600 M	$650 M	$590 M	$580 M	$550 M
Total Project Cost**	**$2,220 M**	**$2,450 M**	**$2,140 M**	**$2,180 M**	**$2,010 M**

Notes:

* Estimated costs escalated to the assumed mid-point of construction using 5% per year and funding availability.

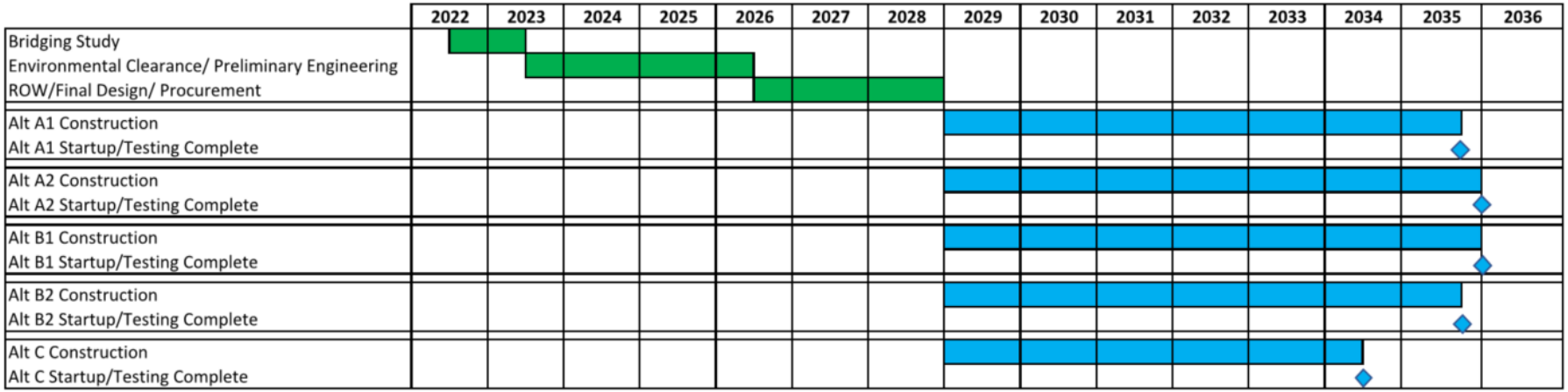
** Total project cost does not include possible Caltrain 22nd Street Station relocation/modifications.

PAX Project Schedule

San Francisco County Transportation Authority

Timeline assumes funding availability and accounts for:

- Pre-Environmental Study effort
- Alignment with railyard development study findings
- Reference design development
- Different tunneling methods



Initial Risk Assessment

San Francisco County Transportation Authority

Identified Challenges

1. Settlement from tunneling
2. Utility impacts
3. Impacts to rail operations during construction
4. Interface with DTX and Railyards projects
5. Impacts to I-280 viaduct and existing Caltrain tunnels
6. Responsibility for ownership/operations
7. Project funding

Table 10-1. Risk Scoring Matrix

SCORE	LOW (1)	MED (2)	HIGH (3)	VERY HIGH (4)	SIGNIFICANT (5)	RISK SCORE (Average of Cost and Schedule Impact X Probability)
(C) Cost	< $2M	$2 – 5M	$5 – 10M	$10 – 50M	> $50M	**High > 10**
(T) Time	< 1 Month	1 – 3 Months	3 – 6 Months	6 – 12 Months	>12 Months	**Med 3 – 10**
(P) Probability	< 10%	10 – 50%	50 – 70%	70 – 90%	>90%	**Low <3**

Takeaways

San Francisco County Transportation Authority

Alternative A (long tunnel)

- Pros: Greatest improvement to rail operations; minimization of construction impacts
- Cons: Highest cost; requires replacement of 22nd St Station

Alternative B (mid-length tunnel)

- Pros: Allows use of 22nd St Station (with modifications); lower cost than Alternative A
- Cons: Complex interfaces with existing rail and freeway infrastructure

Alternative C (short tunnel)

- Pros: Allows use of 22nd St Station (with minimal modifications); lowest cost alternative
- Cons: Greatest construction impacts, including to existing rail operations

Next Steps: Pre-Environmental Study

San Francisco County Transportation Authority

- Recommend advancing to Pre-Environmental Study, to prepare PAX for environmental review
- Goal of next phase to identify 1-2 most viable alternatives

Key Activities:

- Additional analysis of alternatives
- Assessment of opportunities to reduce cost and risk
- Integration of design/cost for replacement of 22nd St Station
- Preparation of strategy for the environmental phase
- Technical coordination with Railyard and DTX
- Public outreach and stakeholder engagement

Thank you.
Questions?

sfcta.org

San Francisco
County Transportation
Authority

sfcta.org/stay-connected